

PATENT ABSTRACTS OF JAPAN

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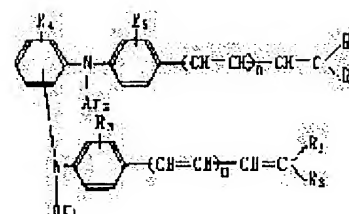
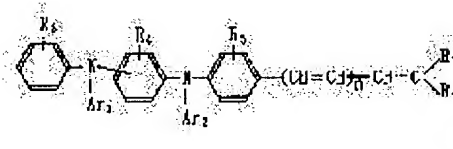
(21)Application number : 04-173177 (71)Applicant : KONICA CORP
(22)Date of filing : 30.06.1992 (72)Inventor : SUZUKI SHINICHI
SHIBATA TOYOKO
TAKEUCHI SHIGEKI

(54) ORGANIC ELECTROLUMINESCENT ELEMENT

(57)Abstract:

PURPOSE: To obtain an organic electroluminescent element which has high luminous intensity and durability and is practically usable by forming a layer contg. a specific phenylenediamine deriv. in the element.

CONSTITUTION: At least one layer contg. an org. compd. of formula I or II is formed in the element. In those formulas, R1 and R2 are each H, or an optionally substd. alkyl, aryl, aralkyl, or heterocyclic group provided that they are not simultaneously H and that they may combine with each other to form a ring together with the carbon atom to which they are bonded; R3, R4, and R5 are each H, halogen, alkyl, or alkoxy; Ar1 and Ar2 are each an optionally substd. alkyl, aryl, or alkoxy group; and n is 0 or 1.



LEGAL STATUS

[Date of request for examination]

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[Patent number]

[Date of registration]

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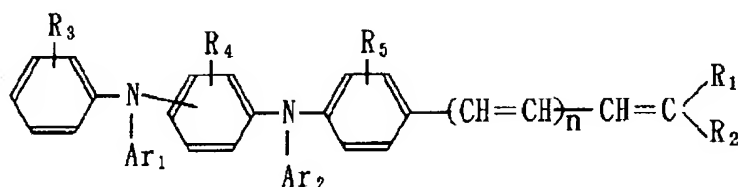
CLAIMS

[Claim(s)]

[Claim 1] An organic electroluminescent element characterized by preparing further at least a layer containing an organic compound expressed with the following general formula [1].

[Formula 1]

一般式 [1]

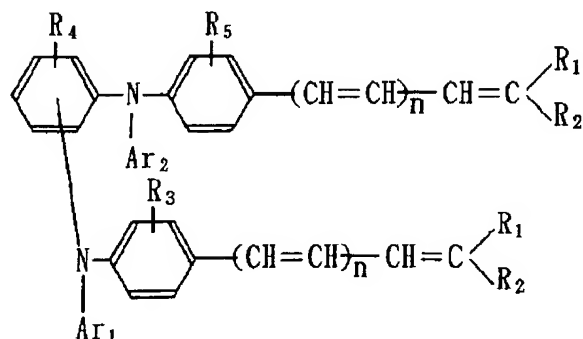


R1 and R2 may express a hydrogen atom, an alkyl group, an aryl group, an aralkyl radical, and a heterocycle radical among [type, and those radicals may have a substituent. However, R1 and R2 may form a ring with the carbon atom which did not turn into a hydrogen atom at coincidence, and has combined R1 and R2. R3, R4, and R5 express a hydrogen atom, a halogen atom, an alkyl group, and an alkoxy group. Ar1 and Ar2 may express an alkyl group, an aryl group, and an aralkyl radical, and these radicals may have a substituent. n is the integer of 0 or 1.]

[Claim 2] An organic electroluminescent element characterized by preparing further at least a layer containing an organic compound expressed with the following general formula [2].

[Formula 2]

一般式 [2]



R1 and R2 may express a hydrogen atom, an alkyl group, an aryl group, an aralkyl radical, and a heterocycle radical among [type, and those radicals may have a substituent. However, R1 and R2 may form a ring with the carbon atom which did not turn into a hydrogen atom at coincidence, and has combined R1 and R2. R3, R4, and R5 express a hydrogen atom, a halogen atom, an alkyl group, and an alkoxy group. Ar1 and Ar2 may express an alkyl group, an aryl group, and an aralkyl radical, and these radicals may have a substituent. n is the integer of 0 or 1.]

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] Especially this invention relates to the organic electroluminescent element used for the plane light source, a flat display, etc. about an organic electroluminescent element.

[0002]

[Description of the Prior Art] The organic electroluminescent element consists of counterelectrodes of the pair the organic luminous layer and this whose layer were pinched, and by the electron poured in from one electrode, and the electron hole poured in from another electrode, recombination starts the luminescence within a luminous layer, and in case the emitter excited and excited at energy levels with a more expensive emitter returns to the original ground state, it is generated by emitting energy as a light. Since an organic compound thin film comes to be used for such a carrier impregnation mold electroluminescent element as a luminous layer, what has strong luminescence reinforcement has come to be obtained. For example, what combined the electron hole moving bed, the luminous layer, and the electronic transition layer is indicated by what used the single crystal anthracene etc. for the U.S. Pat. No. 3,530,325 number as an emitter, the thing which combined the hole-injection layer and the organic emitter layer with JP,59-194393,A, the thing which combined the hole-injection transportation layer and the organic electron injection transportation layer with JP,63-295695,A and Jpn. Journal of Applied Physics, vol27 and No2, and P269-271, and luminescence reinforcement has so far been improved by these.

[0003] However, in the conventional organic electroluminescent element of a configuration of having mentioned above, although luminescence reinforcement was improved, a problem is in endurance and it had not reached the luminescence reinforcement and endurance of practical use level yet. Therefore, the reinforcement of luminescence is strong more and development of the electroluminescent element of high endurance was desired.

[0004]

[Objects of the Invention] This invention was made in view of the above-mentioned actual condition, and the purpose has luminescence reinforcement in offering the electroluminescent element of the practical use level of high endurance strongly more.

[0005]

[Means for Solving the Problem] In an electroluminescent element which consists of organic compound layers (one layer or two or more layers) pinched by a

counterelectrode of a pair, and these as a result of repeating research of efforts wholeheartedly, in order that this invention persons may attain the above-mentioned purpose It found out being attained by organic electroluminescent element characterized by preparing further at least a layer containing an organic compound expressed with a general formula [1] which specified a component to each which was shown in the above "** 1" or "** 2", or [2].

[0006] In a general formula [1] and [2], ring machines, such as a furil, thienyl, and quinolyl, are mentioned as radicals, such as benzyl and phenethyl, and a heterocycle radical as radicals, such as phenyl and naphthyl, and an aralkyl radical as radicals, such as methyl, ethyl, propyl, and butyl, and an aryl group as said alkyl group which R1 and R2 express. As an alkyl group of R3, R4, and R5, radicals, such as methoxy and ethoxy, propoxy and butoxy one, are mentioned as atoms, such as fluorine, chlorine, a bromine, and iodine, and an alkoxy group as radicals, such as methyl, ethyl, propyl, and butyl, and a halogen atom.

[0007] As an alkyl group of Ar1 and Ar2, radicals, such as benzyl and phenethyl, are mentioned as each radical of phenyl and naphthyl, and an aralkyl radical as each radical of methyl, ethyl, propyl, and butyl, and an aryl group.

[0008] In addition, the above R1, R2, Ar1, and Ar2 may have a substituent, and its dialkylamino radicals, such as halogen atoms, such as alkoxy groups, such as alkyl group [, such as methyl, ethyl, propyl, and butyl,], methoxy, and ethoxy ** propoxy, fluorine, chlorine, a bromine, and iodine, dimethylamino, and diethylamino, etc. are desirable.

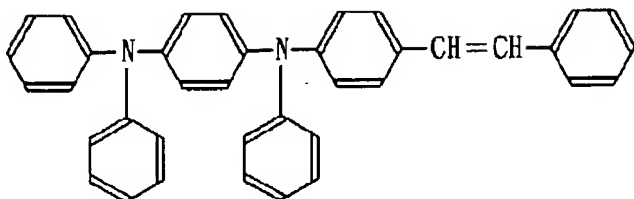
[0009] Next, an example expressed with a general formula [1] is shown.

[0010]

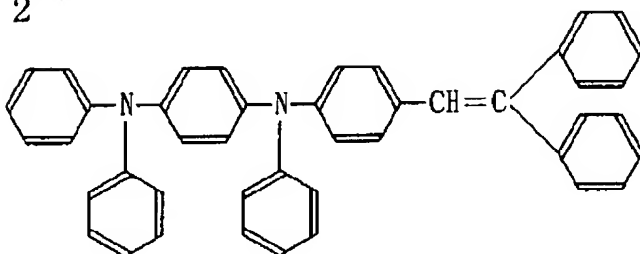
[Formula 3]

: 例示化合物 :

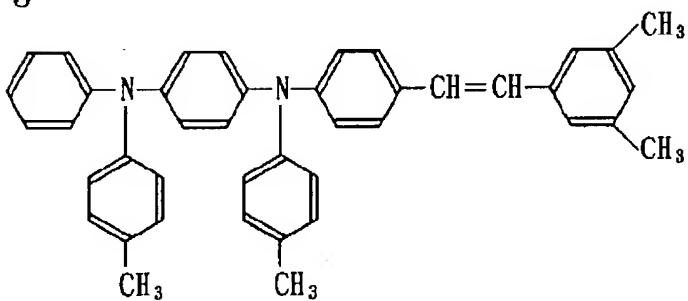
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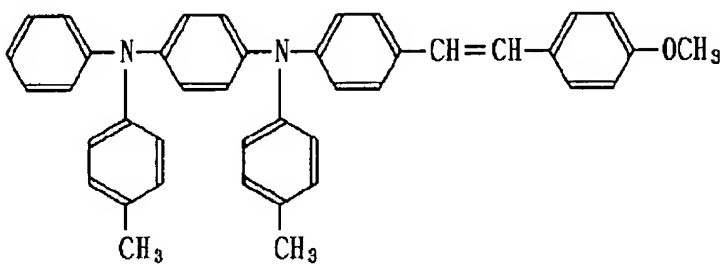
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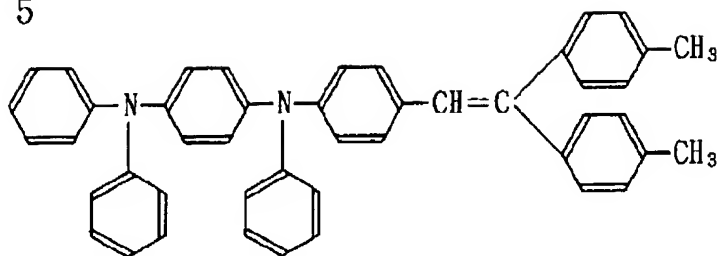
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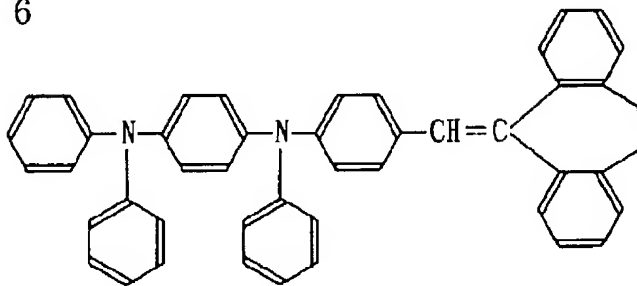
[0011]

[Formula 4]

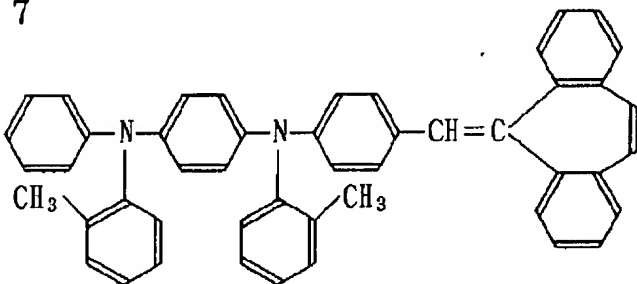
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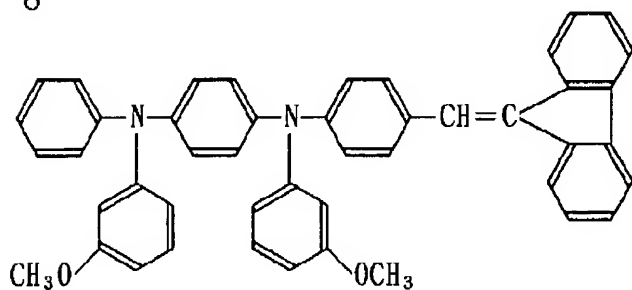
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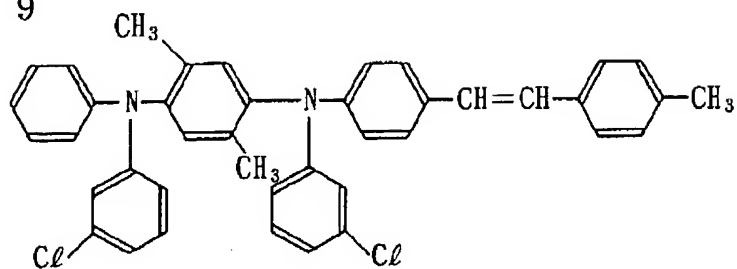
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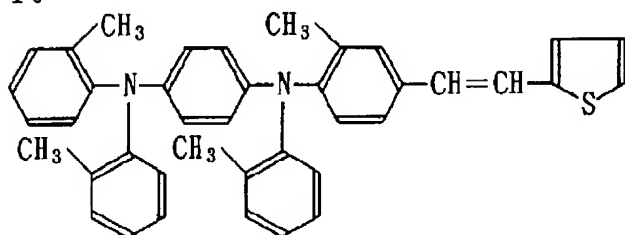
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[Formula 5]

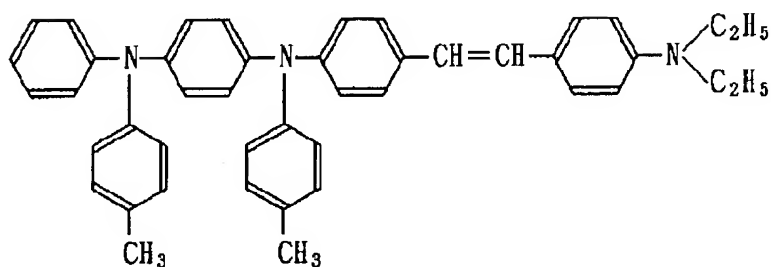
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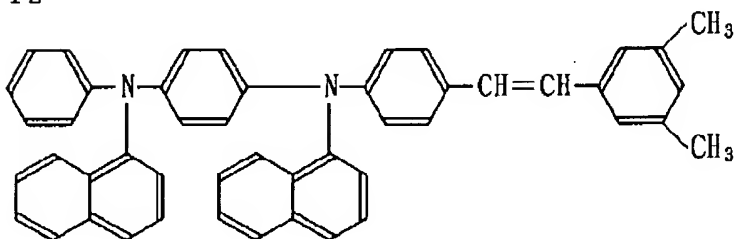
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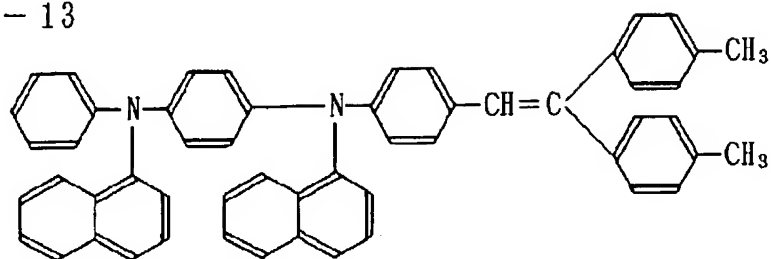
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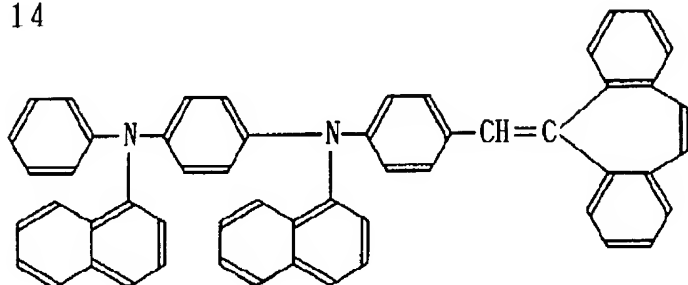
[0013]

[Formula 6]

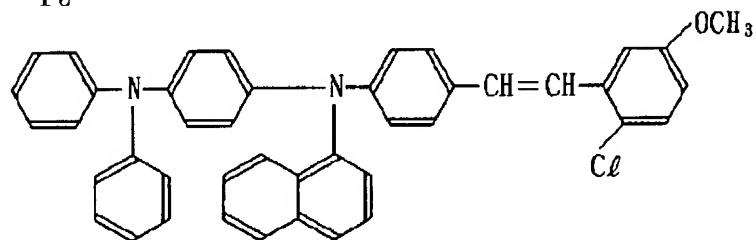
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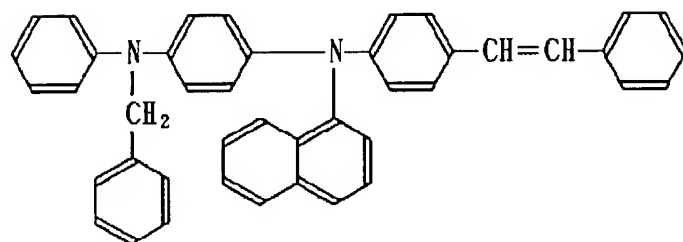
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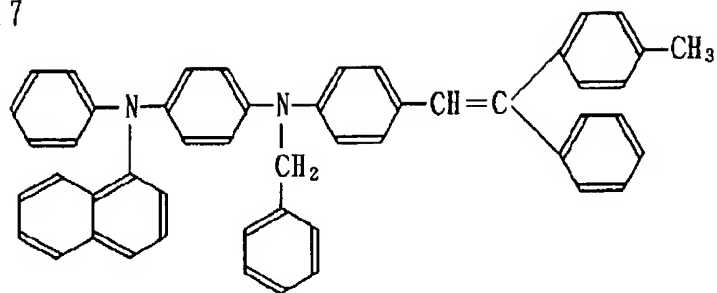
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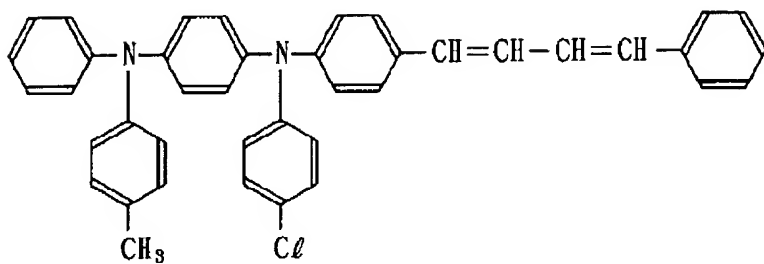
[0014]

[Formula 7]

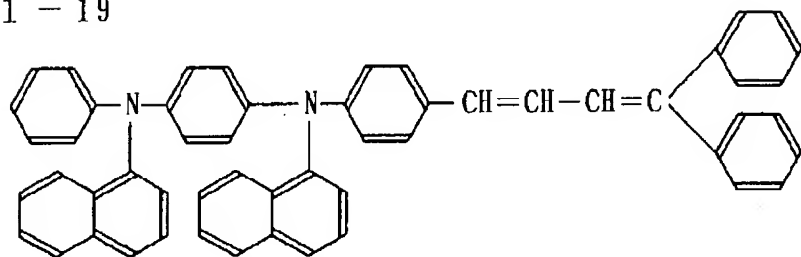
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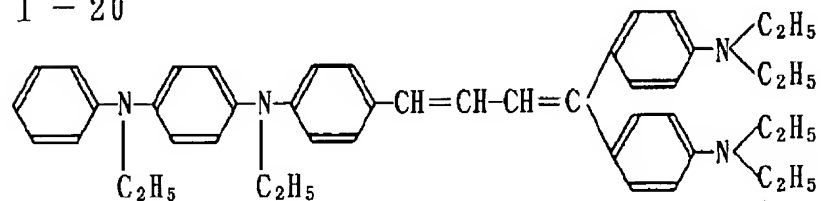
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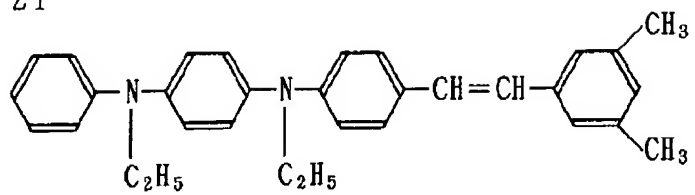
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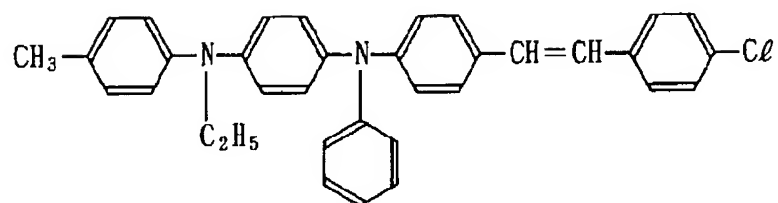
[0015]

[Formula 8]

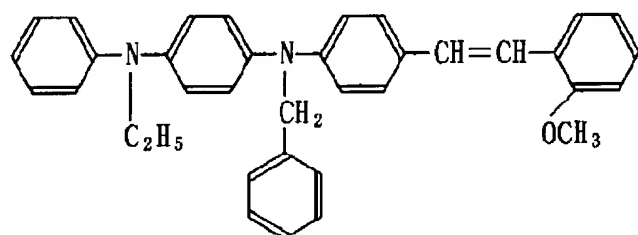
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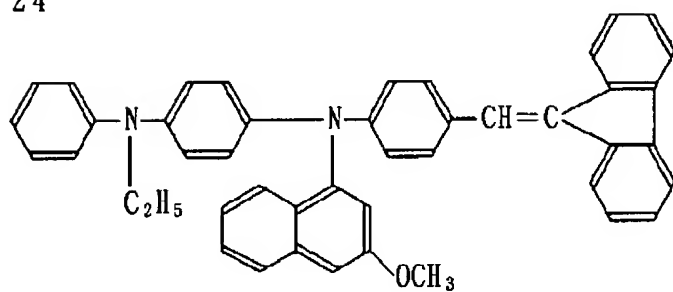
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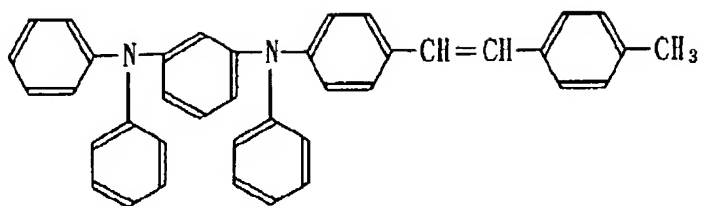
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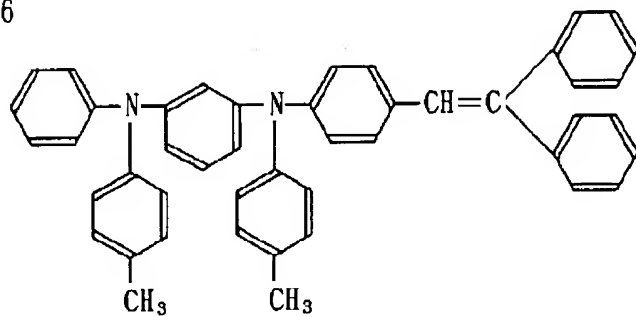
[0016]

[Formula 9]

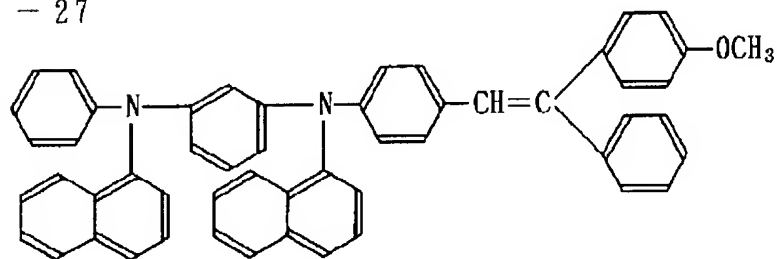
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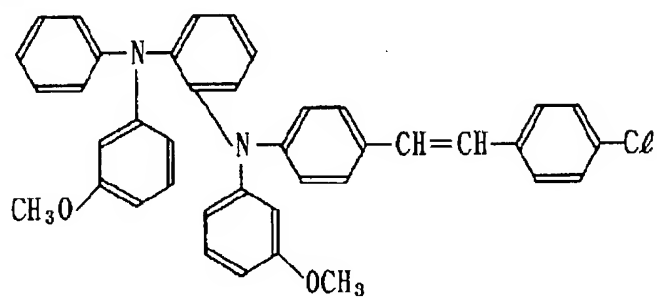
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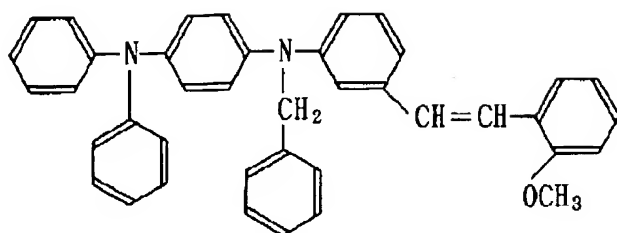
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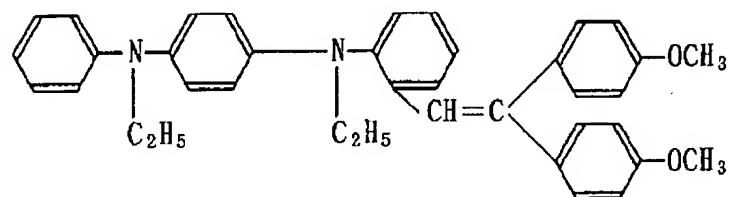
[0017]

[Formula 10]

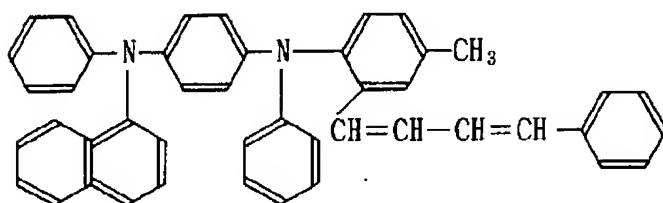
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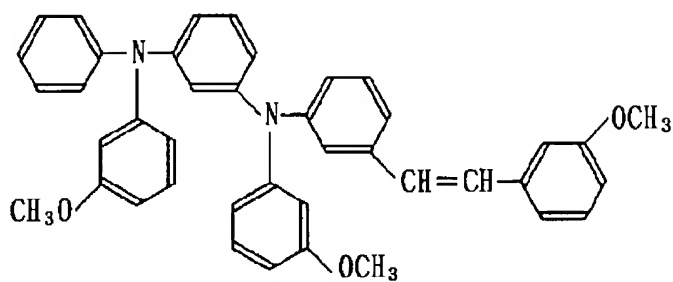
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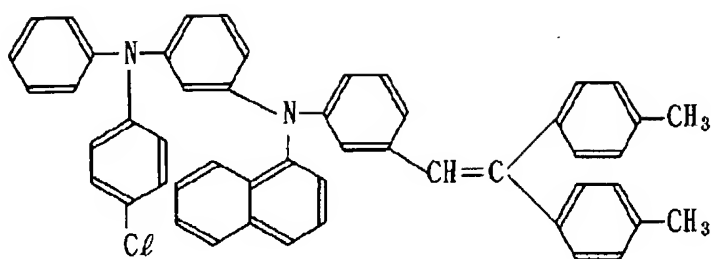
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[0018]

[Formula 11]

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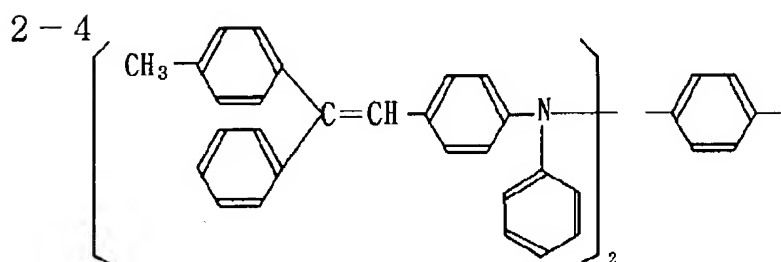
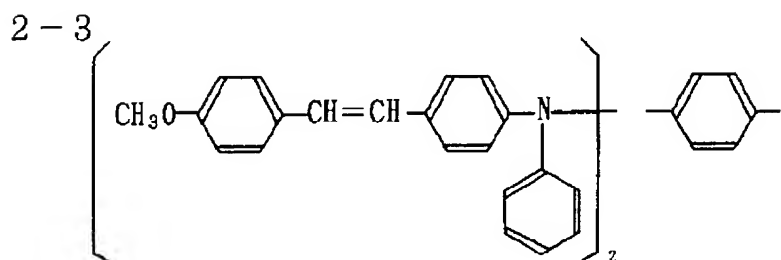
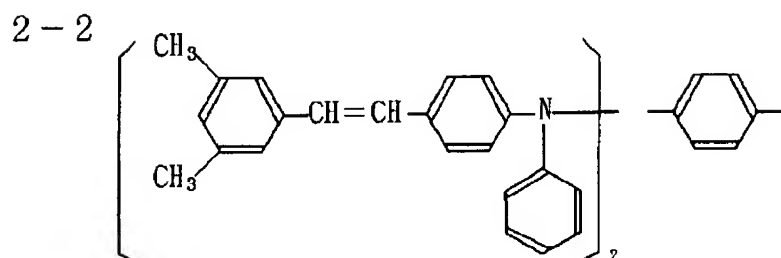
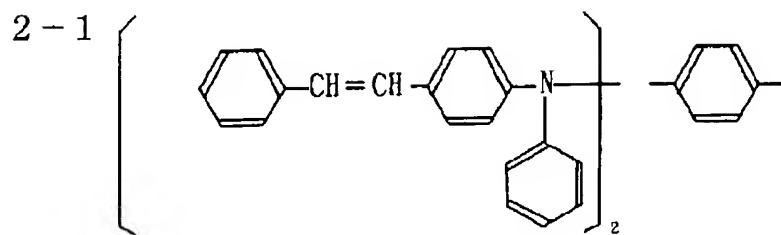


[0019] Next, the example expressed with a general formula [2] is shown.

[0020]

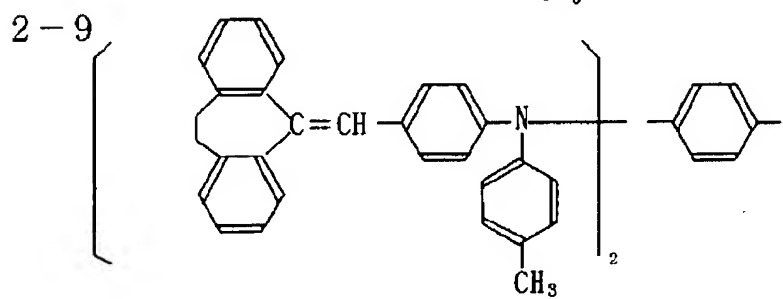
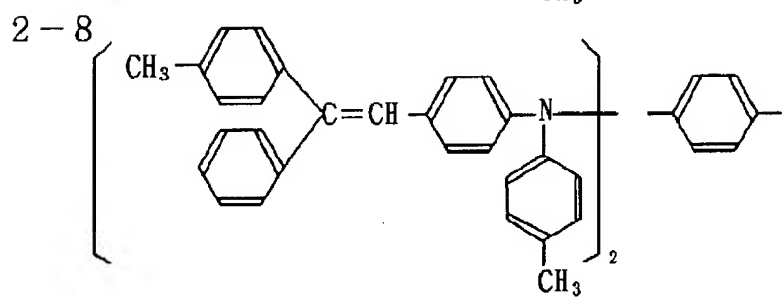
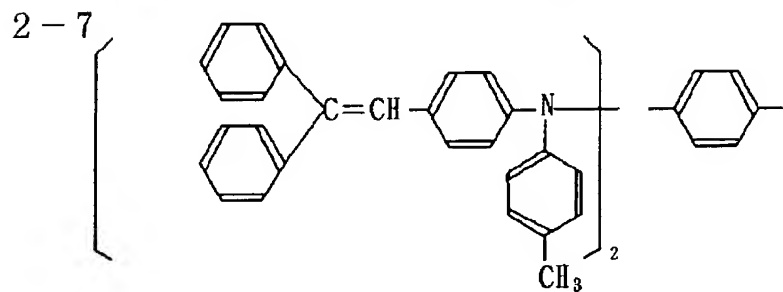
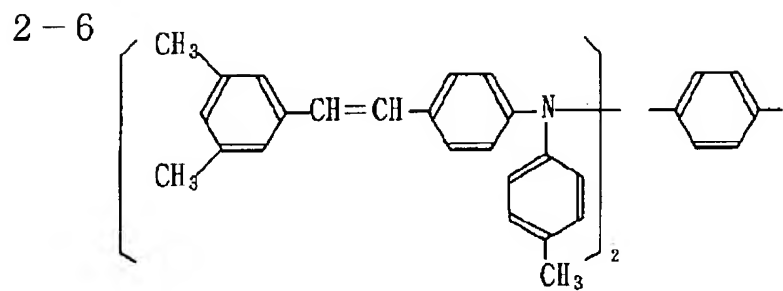
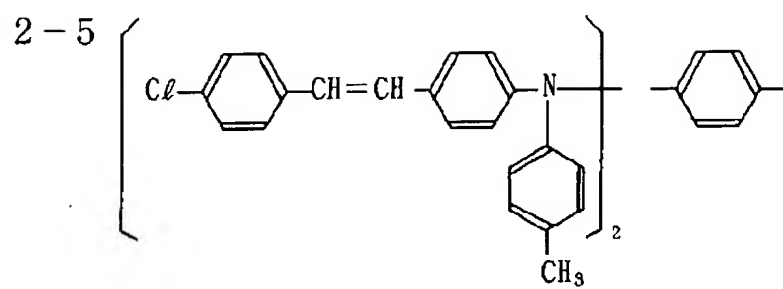
[Formula 12]

例示化合物



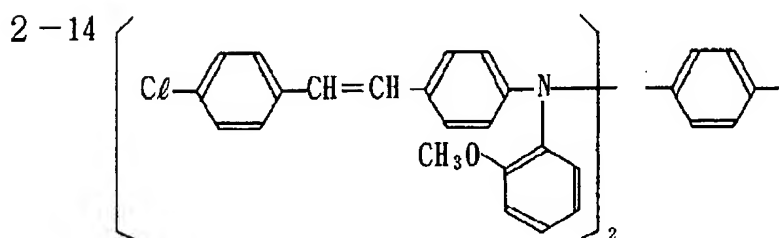
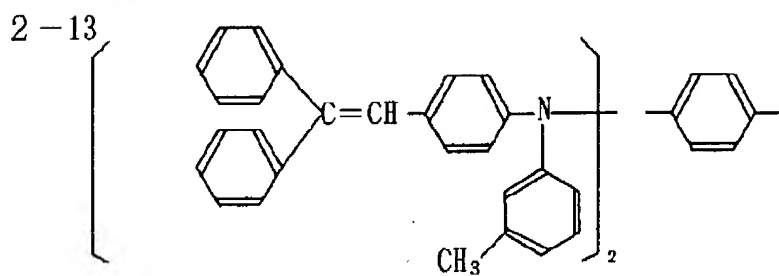
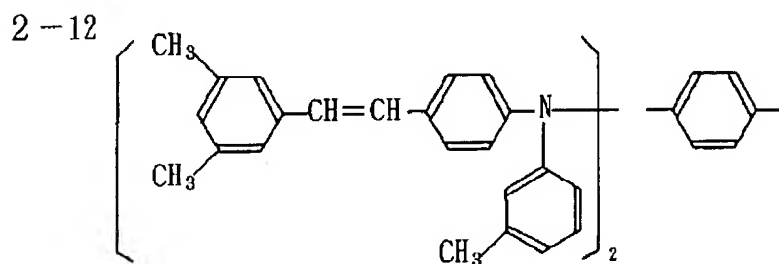
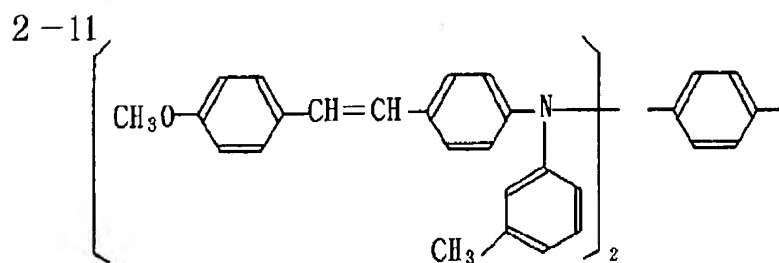
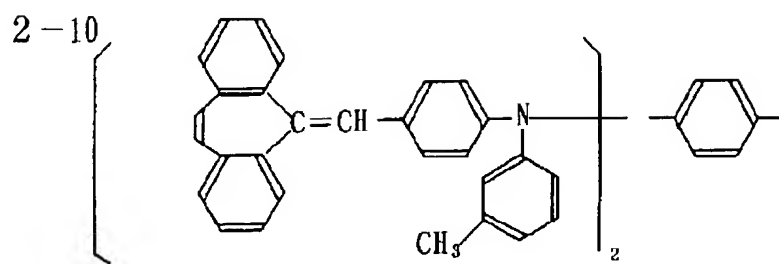
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[Formula 13]



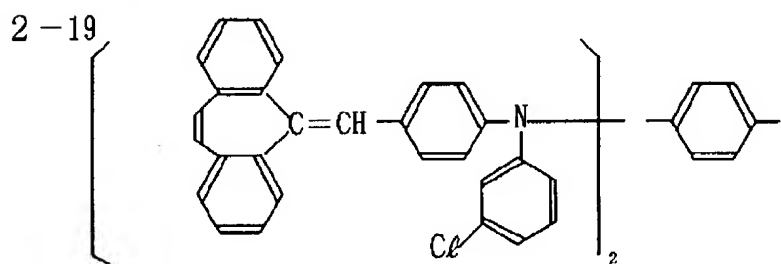
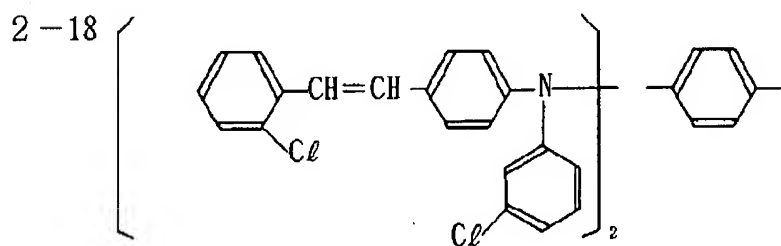
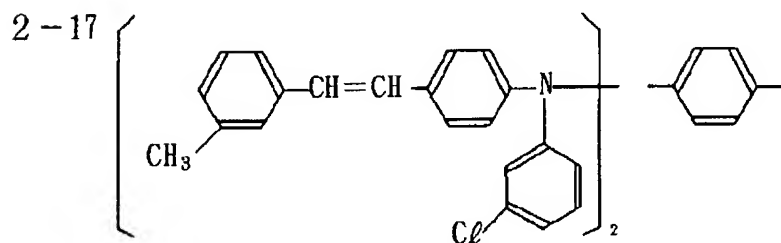
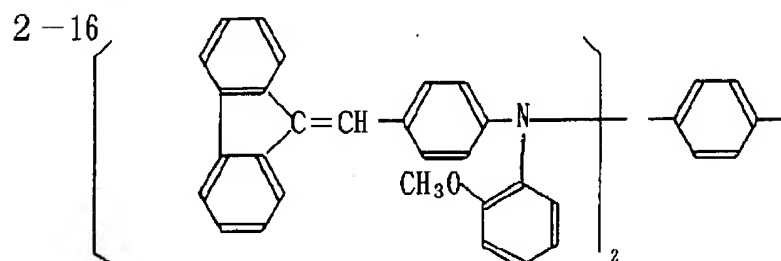
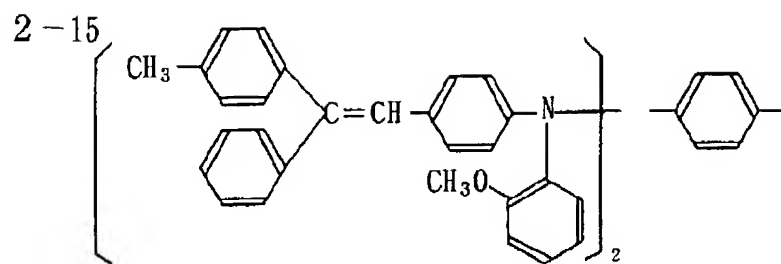
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[Formula 14]



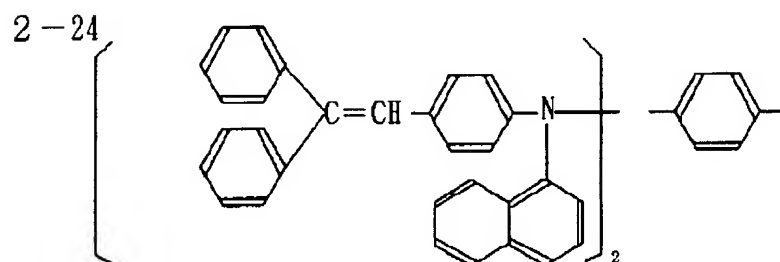
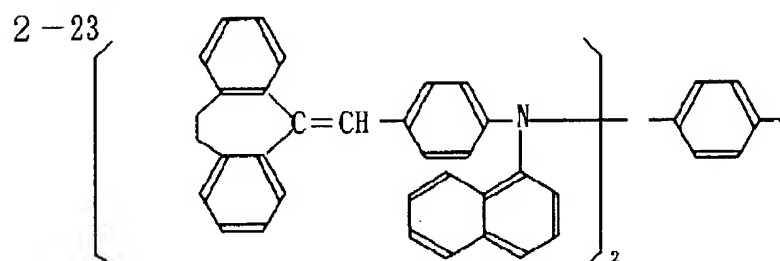
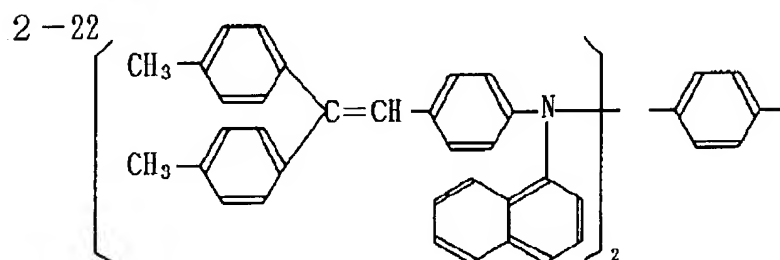
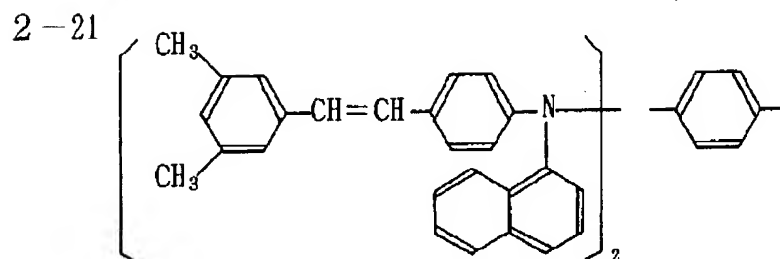
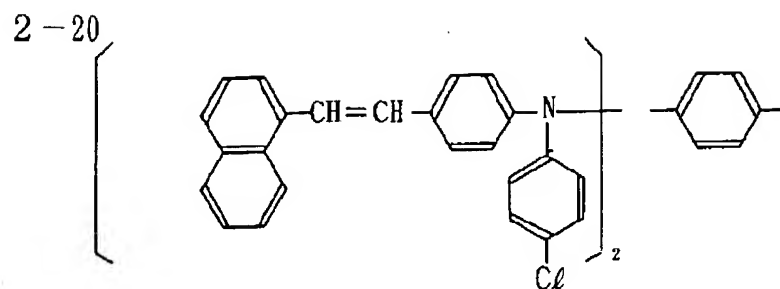
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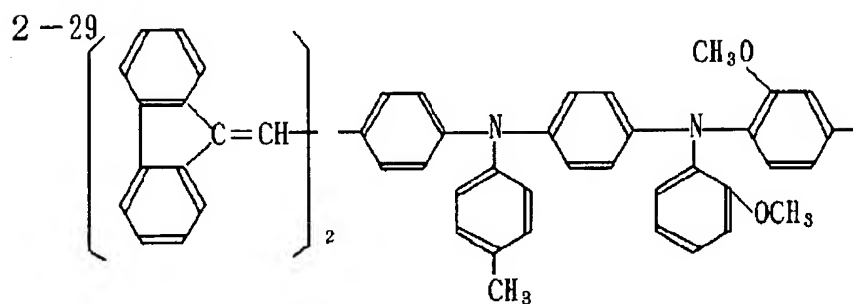
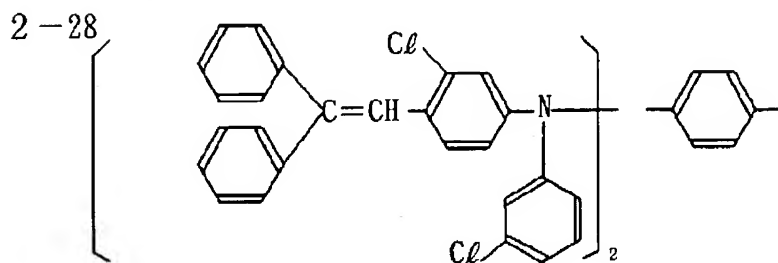
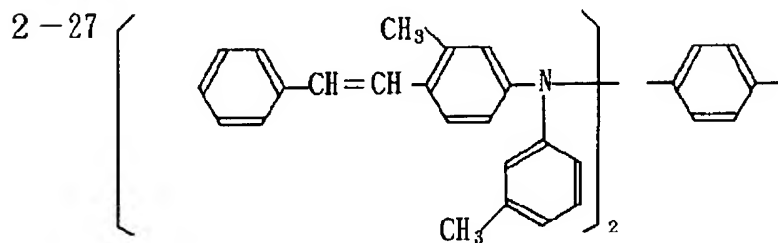
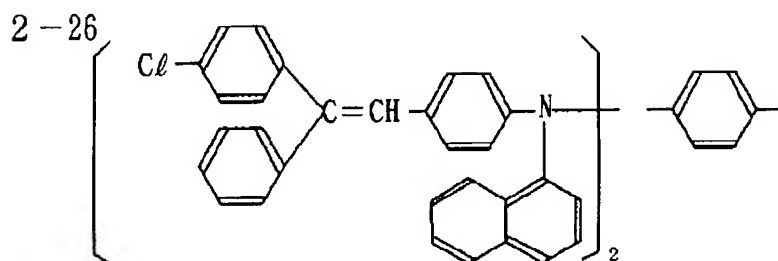
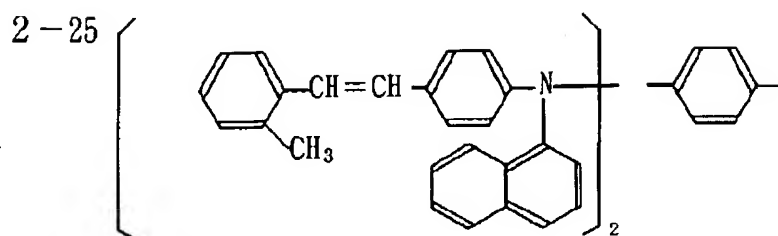
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[Formula 16]



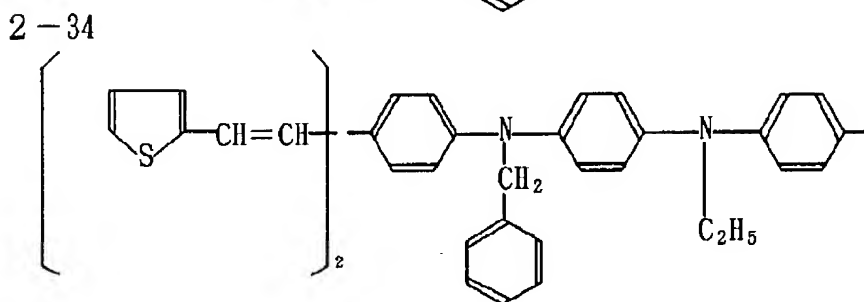
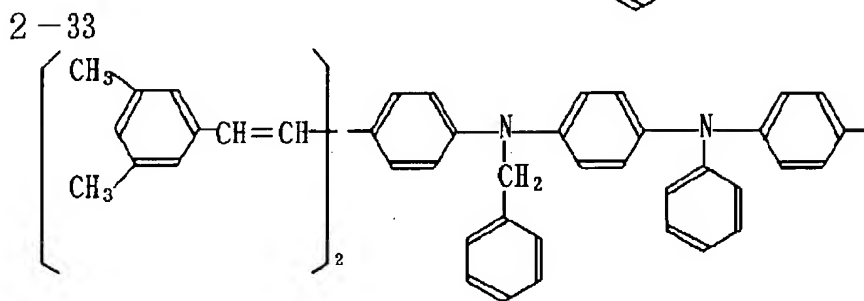
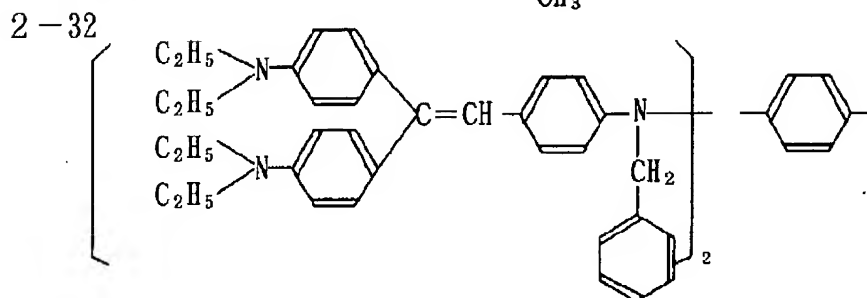
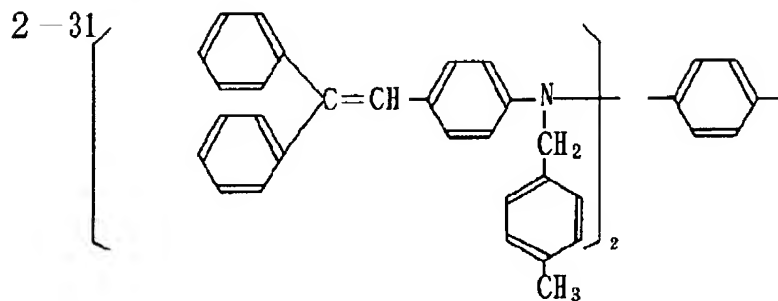
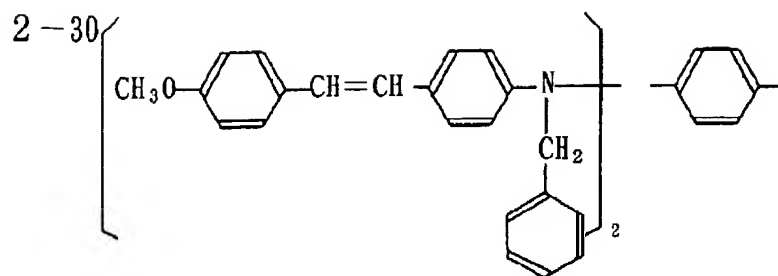
[0025]

[Formula 17]



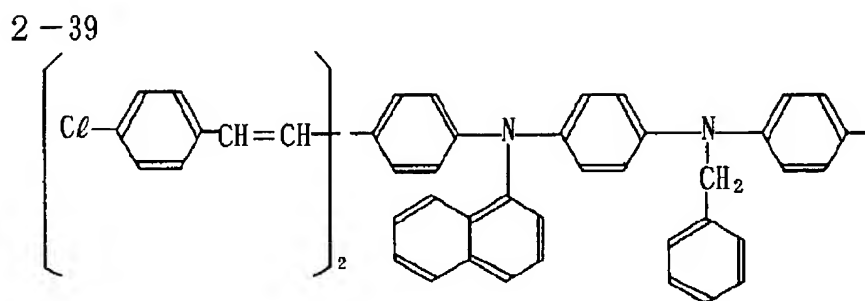
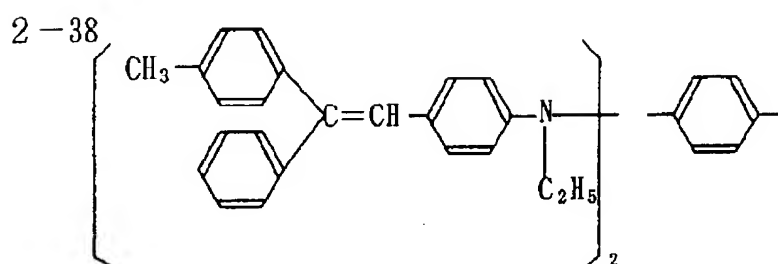
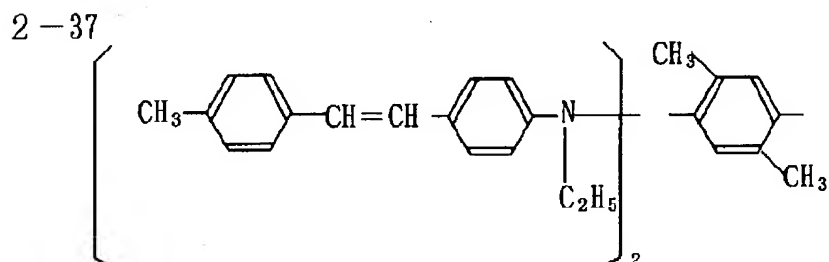
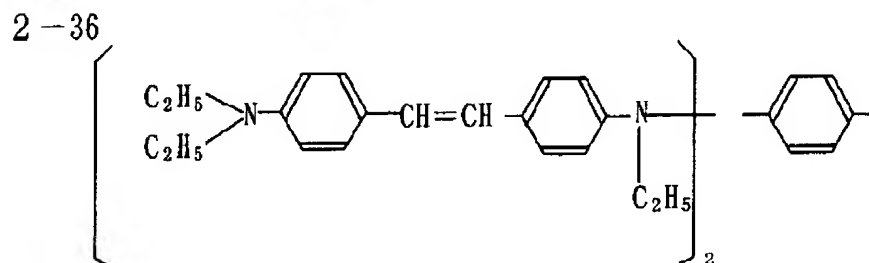
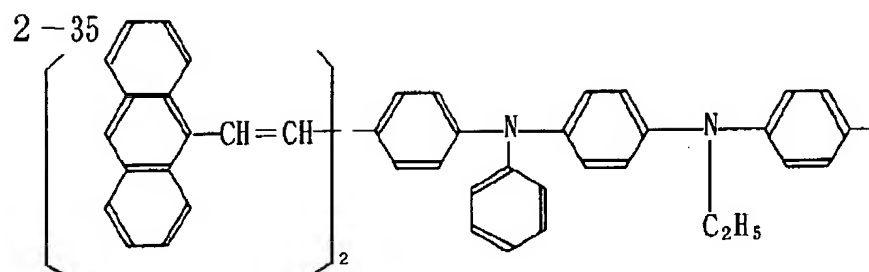
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[Formula 18]



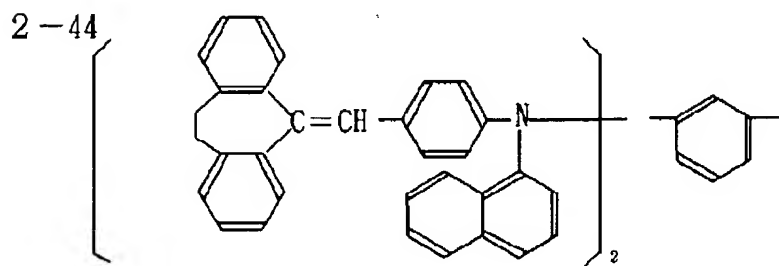
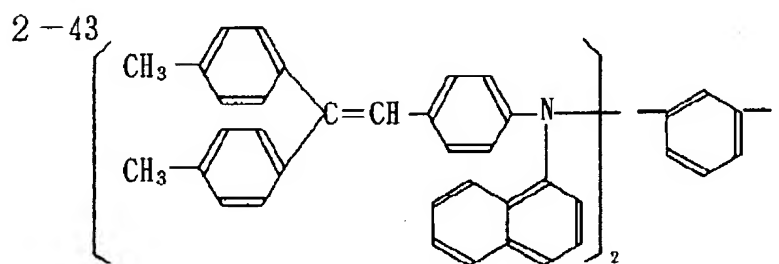
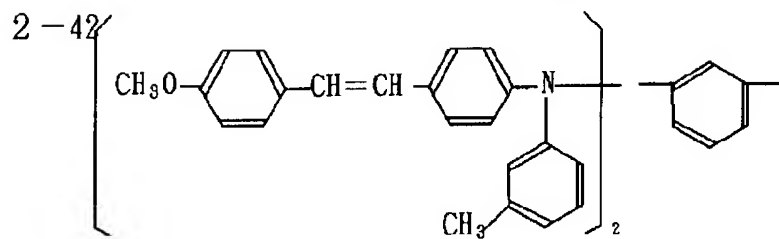
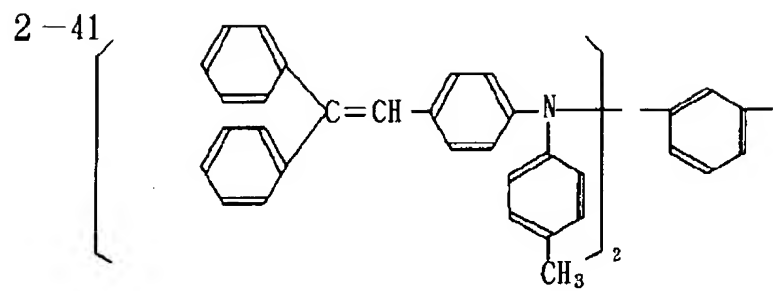
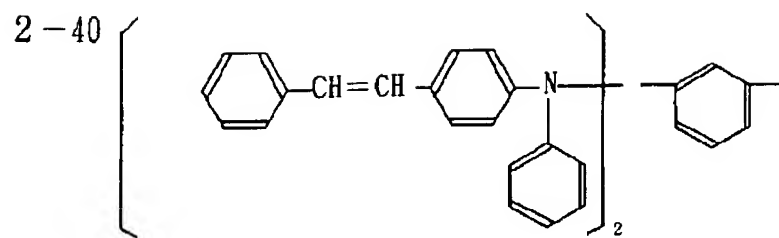
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[Formula 19]



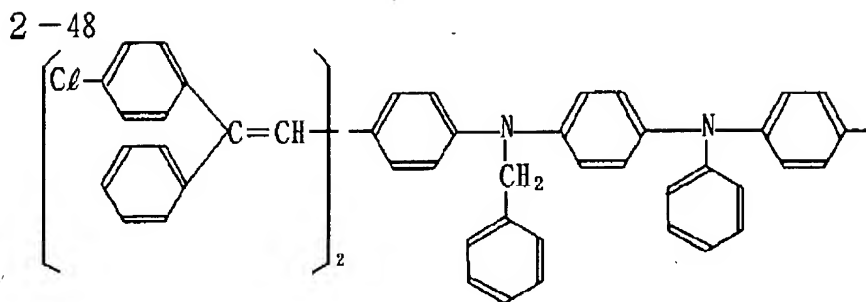
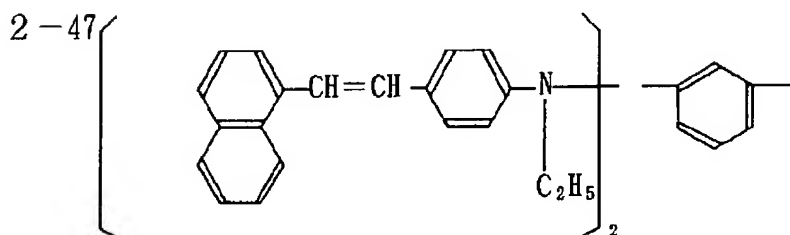
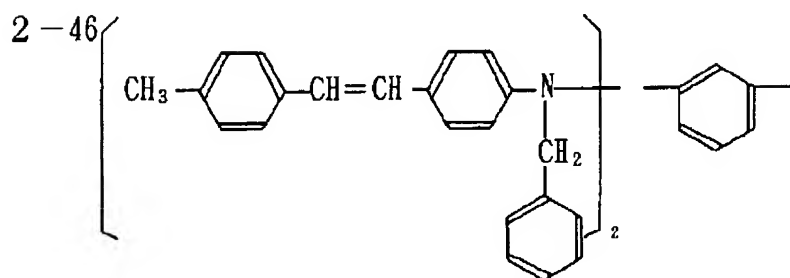
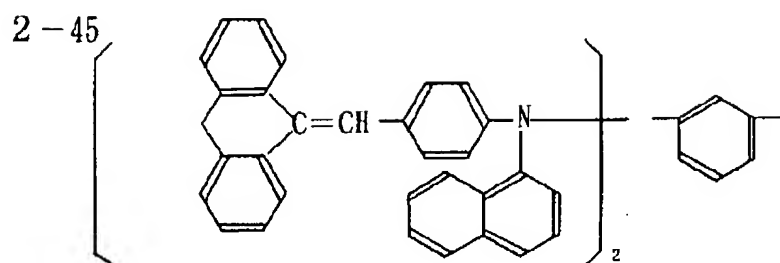
[0028]

[Formula 20]



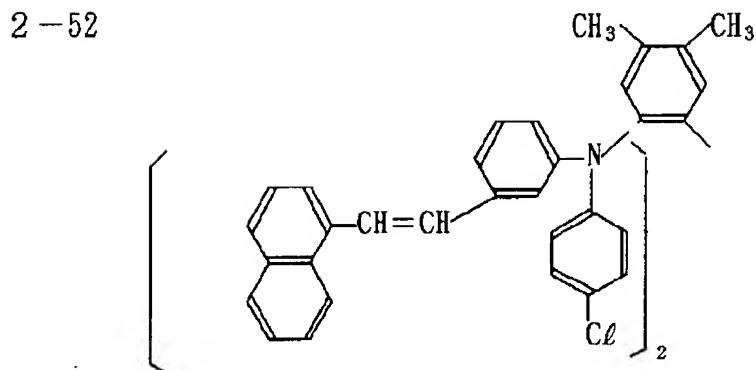
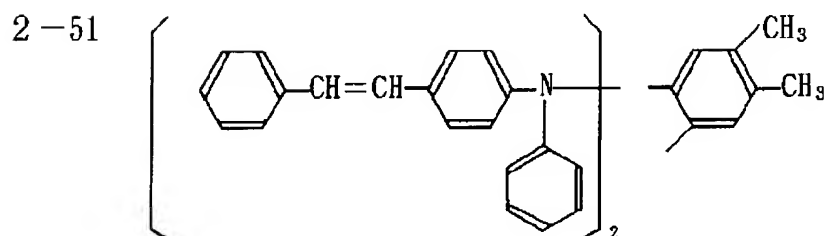
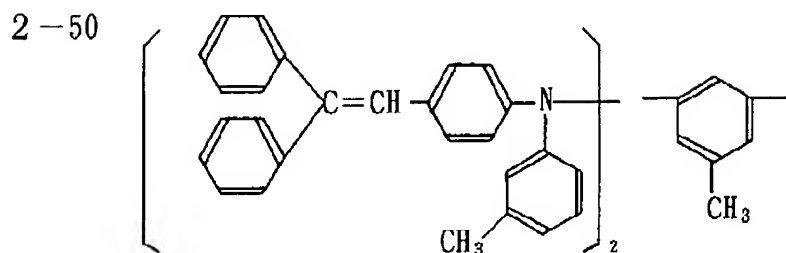
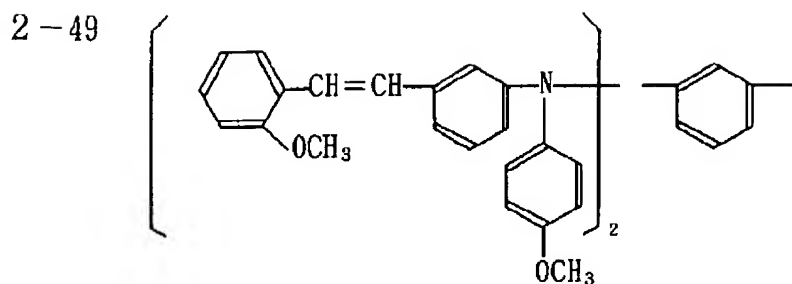
[0029]

[Formula 21]



[0030]

[Formula 22]



[0031] Although there are various modes in the configuration of the organic thin film electroluminescent element of this invention It consists of counterelectrodes of the pair two or more organic compound layers and these layers of whose were pinched fundamentally. Specifically ** Although a substrate / anode plate / hole-injection layer / luminous layer / cathode (drawing 1 (1)), ** substrate / anode plate / luminous layer / electron injection layer / cathode (drawing 1 (2)), ** substrate / anode plate / hole-injection layer / luminous layer / electron injection layer / cathode (drawing 1 (3)), etc. are mentioned This invention is

not necessarily limited to this configuration, and is set to each. Prepare a luminous layer, a hole-injection layer, and a two or more layers electron injection layer, or moreover, make it the configuration which repeated and carried out the laminating of a hole-injection layer / luminous layer, a luminous layer / electron injection layer, and the hole-injection layer / luminous layer / electron injection layer in each, or It does not interfere, even if it prepares the mixolimnion of hole-injection material and luminescence material between the mixolimnion of electron injection material and luminescence material, a hole-injection layer, and a luminous layer or prepares other layers in each again between a luminous layer and an electron injection layer.

[0032] The compound (a general formula [1], [2]) of this invention is used for a hole-injection layer or a luminous layer.

[0033] A luminous layer is formed by vacuum deposition, the spin coat method, the cast method, etc., and the thickness has desirable 10-1000nm, and it is 20-150nm more preferably. A hole-injection layer is formed by vacuum deposition, the spin coat method, the cast method, etc., and the thickness has desirable 10-1000nm, and it is 40-200nm more preferably. An electron injection layer is formed by vacuum deposition, the spin coat method, the cast method, etc., and the thickness has desirable 10-1000nm, and it is 30-200nm more preferably.

[0034] As for a substrate 1, a metal plate, metal foil, etc., such as plastic sheets, such as glass plates, such as soda glass, non-fluorescent glass, phosphoric acid system glass, and boric acid system glass, a quartz, acrylic resin, styrene resin, polycarbonate system resin, epoxy system resin, polyethylene, polyester, and silicone system resin, and plastic film, and an alumina, are used.

[0035] An anode plate 2 has a desirable thing with a larger work function than 4eV. Carbon, aluminum, Vanadium, iron, cobalt, nickel, chromium, copper, zinc, a tungsten, Metals, such as silver, tin, platinum, and gold, and these alloys, a zinc oxide, indium oxide, Conjugated compounds, such as tin oxide, such as ITO and NES, or a tin oxide indium system, Conductive polymers, such as oxides, such as compounds, such as iodation copper, ZnO:aluminum, and SnO₂:Sb, metaled mixture and also Pori (3-methylthiophene), polypyrrole, and the poly aniline, etc. are used. 10-1000nm of thickness is desirable, and it is 10-200nm more preferably.

[0036] Cathode 3 has a desirable thing with a work function smaller than 4eV, and metals, such as magnesium, calcium, sodium, a potassium, titanium, an indium, an yttrium, a lithium, a gadolinium, an ytterbium, a ruthenium, manganese, aluminum, silver, tin, and lead, and these alloys, aluminum / aluminum-oxide complex, etc. are used. 10-1000nm of thickness is desirable, and it is 10-900nm more preferably.

[0037] When taking out light from an electrode, as for either at least, it is desirable among an anode plate 2 and cathode 3 to be [which is 10% or more of permeability] transparence, or that it is translucent, and a substrate 1 also has only a transparent or translucent anode plate 2 the transparence of 10% or more of permeability or when translucent.

[0038] As an example of the photogene used for a luminous layer 4 In addition to the organic compound expressed by said general formula, an oxy-NOIDO compound (thing given in JP, 63-295695, A, JP, 2-15595, A, 2-66873, etc.), Perylene compound () ["Soluble Perylene] Fluorescent Dyes with Photostability, vol.115, P2927 "" , Jpn. Journal (1982) of Applied Physics, vol.27, No2, L269 ", "Bull. Chem. Soc. Jpn. vol. 25, L411 (1952)" Europe JP, 553, 353, B A1 No. , JP, 55-36849, A, 57-51781, JP, 2-66873, A, 2-196885, 2-288188, (1988) A thing given in 3-791 etc., a

coumarin compound (JP, 57-51781, A, JP, 2-66873, A, this 3- thing given in 792 etc.), An aza-coumarin compound (thing given in JP, 3-792, A etc.), an oxazole compound (thing given in a U.S. Pat. No. 3, 257, 203 number, JP, 3-193763, A, 3-162482, 2-220396, etc.), An OKISA diazole compound (thing given in a U.S. Pat. No. 3, 189, 447 number, JP, 2-216791, A, etc.), A peri non compound (thing given in JP, 2-88689, A, 2-289676, etc.), A pyrrolo pyrrole compound (thing given in JP, 2-296891, A etc.), A naphthalene compound (thing given in JP, 57-51781, A, JP, 2-255789, A, 3-162485, etc.), An anthracene compound (thing given in JP, 56-46234, A, 57-51781, JP, 2-66873, A, 3-162485, etc.), A fluorene compound (thing given in JP, 54-110837, A, JP, 3-162485, A, etc.), A fluoranthene compound (thing given in JP, 3-162485, A etc.), A tetracene compound (thing given in JP, 3-162485, A etc.), A pyrene compound (thing given in JP, 57-51781, A, JP, 3-162485, A, 3-502333, etc.), A coronene compound (thing given in JP, 3-162485, A etc.), a quinolone compound, and an aza-quinolone compound (thing given in JP, 3-162483, A etc.), A pyrazoline derivative And a pyrazolone derivative a U.S. Pat. No. 3, 180, 729 number -- said -- No. 4, 278, 746, JP, 55-88064, A, 55-88065, 49-105537, 55-51086, 56-80051, 56-88141, 57-45545, and 54-112637 -- A thing given in 55-74546, JP, 2-220394, A, 3-162486, etc., A rhodamine compound (thing given in JP, 2-66873, A, 3-188189, etc.), A chrysene compound (thing given in JP, 57-51781, A, JP, 3-502333, A, etc.), A phenanthrene compound (thing given in JP, 57-51781, A etc.), A cyclopentadiene compound (thing given in JP, 2-289675, A etc.), A stilbene compound a U.S. Pat. No. 4, 356, 429 number, JP, 57-51781, A, 61-210363, 61-228451, 61-14642, 61-72255, 62-47646, 62-36674, 62-10652, and 62-30255 -- A thing given in 60-934454, 60-94462, 60-174749, 60-175052, 63-149652, JP, 1-173034, A, 1-200262, 1-245087, etc., A diphenyl quinone compound (thing given in "Polymer Preprints, Japan, vol. 37, p681 (1988)", JP, 3-152184, A, etc.), A styryl compound (thing given in JP, 1-245087, A, 2-209988, 2-222484, 2-247278, etc.), A butadiene compound (thing given in a U.S. Pat. No. 4, 356, 429 number, JP, 57-51781, A, etc.), A dicyanomethylene pyran compound (thing given in JP, 2-66873, A, 3-162481, etc.), A dicyanomethylene thiopyran compound (thing given in JP, 2-66873, A, 3-162481, etc.), A fluorescein compound (thing given in JP, 2-66873, A etc.), A pyrylium compound (thing given in JP, 2-66873, A etc.), a thia pyrylium compound (thing given in JP, 2-66873, A etc.), A SERENA pyrylium compound (thing given in JP, 2-66873, A etc.), A TERURO pyrylium compound (thing given in JP, 2-66873, A etc.), An aromatic series aldadiene compound (thing given in JP, 2-220393, A etc.), An oligo phenylene compound (thing given in JP, 3-162484, A etc.), A thoxanthene compound (thing given in JP, 3-177486, A etc.), An anthracene compound (thing given in JP, 3-178942, A etc.), A cyanine compound (thing given in JP, 2-66873, A etc.), an acridine compound (thing given in JP, 57-51781, A etc.), Metal **** of a 8-hydroxyquinoline compound (thing given in JP, 2-8287, A, 2-8290, etc.), Metal **** of a 2 and 2'-bipyridine compound (thing given in JP, 2-8288, A, 2-8289, etc.), **** of the Schiff salt and an III group metal (thing given in JP, 1-297490, A etc.), Fluorescent materials, such as oxine metal **** (thing given in JP, 3-176993, A etc.) and rare earth **** (thing given in JP, 1-256584, A, 1-282291, etc.), can be used.

[0039] As an example of a hole-injection compound of having the electron hole transportation ability used for the hole-injection layer 5 A triazole derivative (thing given in a U.S. Pat. No. 3, 112, 197 number etc.), An OKISA diazole derivative (thing given in a U.S. Pat. No. 3, 189, 447 number etc.), An imidazole derivative (thing given in JP, 37-16096, B etc.), the poly aryl alkane derivative (a U.S. Pat. No. 3, 615, 402 number -- said -- No. 3, 820, 989) Said 3, 542, 544 numbers, JP, 45-555, B,

51-10983, JP, 51-93224, A, 55-17105, 56-4148, A thing given in 55-108667, 56-36656, 55-156953, etc., a pyrazoline derivative and a pyrazolone derivative (U.S. Pat. No. 3,180,729 -- said -- No. 4,278,746) JP, 55-88064, A, 55-88065, 49-105537, 55-51086, 56-80051, 56-88141, A thing given in 57-45545, 54-112637, 55-74546, etc., a phenylenediamine derivative (a U.S. Pat. No. 3,615,404 number and JP, 51-10105, B --) 46-3712, 47-25336, JP, 54-53435, A, A thing given in 54-110536, 54-119925, etc., an arylamine derivative (a U.S. Pat. No. 3,567,450 number -- said -- No. 3,180,703) said -- No. 3,240,597 -- said -- No. 3,658,520 -- said -- 4,232,103 -- said -- No. 4,175,961 Said 4,012,376 numbers, JP, 49-35702, B, 39-27577, A thing given in JP, 55-144250, A, 56-223437, West Germany JP, 1,110,518, B, etc., An amino substitute chalcone derivative (thing given in a U.S. Pat. No. 3,526,501 number etc.), An oxazole derivative (thing given in a U.S. Pat. No. 3,257,203 number etc.), A styryl anthracene derivative (thing given in JP, 56-46234, A etc.), full -- me -- non -- a derivative (thing given in JP, 54-110837, A etc.) -- a hydrazone derivative (a U.S. Pat. No. 3,717,462 number and JP, 54-59143, A --) 55-52063, 55-52064, 55-46760, 55-8495, 57-148749, JP, 3-136059, A, a thing given in 3-138654 etc., and a stilbene derivative (JP, 61-210363, A --) 61-228451, 61-14642, 61-72255, 62-47646, 62-36674, 62-10652, 62-30255, 60-934454, 60-94462, 60-174749, 60-175052, 63-149652, A thing given in JP, 1-173034, A, 1-200262, etc., A porphyrin compound (thing given in JP, 63-295695, A, JP, 2-12795, A, etc.), an aromatic series tertiary-amine compound and a styryl amine compound (a U.S. Pat. No. 4,127,412 number --) JP, 53-27033, A, 54-58445, 54-149634, 54-64299, 55-79450, 55-144250, 56-119132, 61-295558, 61-98353, 63-295695, JP, 1-274154, A, 1-243393, A thing given in 3-111485 etc., a butadiene compound (thing given in JP, 3-111484, A etc.), A polystyrene derivative (thing given in JP, 3-95291, A etc.), Although a hydrazone derivative (thing given in JP, 3-137187, A etc.), a triphenylmethane color derivative, a tetra-phenyl benzidine derivative (thing given in JP, 3-54289, A etc.), etc. can be used They are a porphyrin compound, an aromatic series tertiary-amine compound, and a styryl amine compound especially preferably.

[0040] As an example of an electron injection compound of having the electronic transportation ability used for the electron injection layer 6 nitration full -- me -- non -- an induction thiopyran dioxide derivative and a diphenoquinone derivative (Polymer Preprints "--) A thing given in Japan, vo 1.37, No3 and P681" (1988), JP, 3-152184, A, etc., A perylene tetra-carboxyl derivative (thing given in Jpn. Journal of Applied Physics, vol.27, "No2, L269" (1988), "Bull. Chem. Soc. Jpn., vol.25, L411" (1952), etc.), an anthra quinodimethan derivative (JP, 57-149259, A and 58-55450 --) A thing given in 61-225151, 61-133750, 63-104061, etc., a deflection ORENIRIDEN methane derivative (JP, 60-69657, A and 61-143764 --) a thing given in 61-148159 etc., and an anthrone derivative (JP, 61-225151, A --) a thing given in 61-233750 etc., an OKISA diazole derivative (thing given in JP, 3-79692, A etc.), and peri -- non, compounds, such as a derivative (thing given in JP, 2-289676, A etc.) and a quinoline complex derivative, can be used.

[0041]

[Example] Next, an example explains this invention concretely.

[0042] After carrying out patterning to the form of a request of the substrate (Pby Nippon Sheet Glass Co., Ltd. 110 E-H-PS) which formed 150nm of ITO(s) on glass as example 1 anode plate, it ground with water in the alumina abrasive material. after rinsing and for [water ultrasonic-cleaning] 10 minutes -- 2 times and acetone ultrasonic cleaning -- for 10 minutes, twice, it carried out twice during isopropyl

alcohol ultrasonic-cleaning 10 minutes, and hot air drying was performed at 90 more degrees C.

[0043] Next, said compound (1-3) was put into the tungsten board (SF208 by Japan Bucks metal incorporated company), vacuum deposition was carried out to this substrate at the membrane formation speed of 0.2 nm/sec under the vacuum conditions of 8.0×10^{-7} Torr, and about 80nm hole-injection layer was formed.

[0044] Subsequently, 8-hydroxy kino RINARU minium was put into the molybdenum boat (SS[by Japan Bucks metal incorporated company]- 1 -9), without breaking vacuum conditions, and the laminating vacuum evaporation of about 60nm luminous layer was carried out at the membrane formation speed of 0.2 nm/sec under the vacuum conditions of 8.0×10^{-7} Torr.

[0045] Furthermore, on this, 500nm vacuum deposition of Mg:Ag (10:1 atomic-ratio alloy) was carried out without breaking vacuum conditions, and cathode was formed.

[0046] Thus, the external power was connected to the obtained organic electroluminescent element, 18V direct current voltage was impressed, and the maximum brightness at that time was measured. Moreover, continuation lighting by 18V direct-current-voltage impression was performed under the temperature desiccation nitrogen-gas-atmosphere mind of 23 degrees C, and the time amount which brightness reduces by half was measured.

[0047] The result is shown in a table 1.

[0048] It replaced with the compound used for an example 2 - 12 hole-injection layers, and the organic electroluminescent element was obtained like the example 1 except having used what was shown in a table 1. The property is shown in a table 1.

[0049] The example of a comparison (1)

The element was created like the example 1 except having used for the hole-injection layer the compound (A-1) shown in after-mentioned "** 23." The result is shown in a table 1.

[0050]

[A table 1]

	正孔注入層 の化合物	(cd/m ²) 最高輝度	(時間) 輝度半減時間
実施例 1	(1 - 3)	270	115
2	(1 - 5)	240	121
3	(1 - 11)	260	108
4	(1 - 14)	230	129
5	(1 - 21)	260	130
6	(1 - 26)	250	117
7	(2 - 1)	240	114
8	(2 - 8)	270	127
9	(2 - 22)	270	112
10	(2 - 26)	250	119
11	(2 - 35)	260	125
12	(2 - 41)	230	110
比較例 (1)	(A - 1)	95	34

[0051] After carrying out patterning to the form of a request of the substrate (Pby Nippon Sheet Glass Co., Ltd.110 E-H-PS) which formed 150nm of ITO(s) on glass as example 13 anode plate, it ground with water in the alumina abrasive material. after rinsing and for [water ultrasonic-cleaning] 10 minutes -- 2 times and acetone ultrasonic cleaning -- for 10 minutes, twice, it carried out twice during isopropyl alcohol ultrasonic-cleaning 10 minutes, and hot air drying was performed at 90 more degrees C.

[0052] Next, said compound (1-2) was put into the tungsten board (SF208 by Japan Bucks metal incorporated company), vacuum deposition was carried out to this substrate at the membrane formation speed of 0.2 nm/sec under the vacuum conditions of 8.0×10^{-7} Torr, and about 60nm luminous layer was formed.

[0053] Subsequently, the compound (A-2) shown in after-mentioned "** 23" was put into the molybdenum boat (SS[by Japan Bucks metal incorporated company]- 1 -9), without breaking vacuum conditions, and the laminating vacuum evaporation of about 80nm electron injection layer was carried out at the membrane formation speed of 0.2 nm/sec under the vacuum conditions of 8.0×10^{-7} Torr.

[0054] Furthermore, on this, 500nm vacuum deposition of Mg:Ag (10:1 atomic-ratio alloy) was carried out without breaking vacuum conditions, and cathode was formed.

[0055] Thus, the external power was connected to the obtained organic electroluminescent element, 18V direct current voltage was impressed, and the maximum brightness at that time was measured. Moreover, continuation lighting by 18V direct-current-voltage impression was performed under the temperature desiccation nitrogen-gas-atmosphere mind of 23 degrees C, and the time amount which brightness reduces by half was measured. The result is shown in a table 2.

[0056] It replaced with the compound used for 14 to example 22 luminous layer, and the organic electroluminescent element was obtained like the example 13 except having used what was shown in a table 2. The property is shown in a table 2.

[0057] The example of a comparison (2)

The element was created like the example 13 except having used for the luminous layer the compound (A-3) shown in after-mentioned "** 23." The result is shown in a table 2.

[0058]

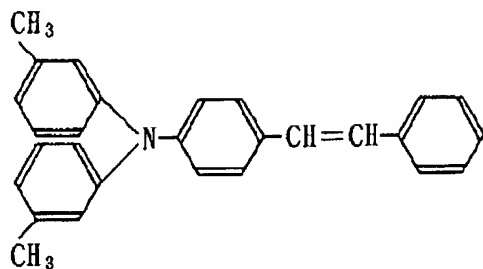
[A table 2]

	発光層の 化合物	(cd/m ²) 最高輝度	(時間) 輝度半減時間
実施例 13	(1 - 2)	140	92
14	(1 - 7)	130	106
15	(1 - 12)	140	112
16	(1 - 20)	120	93
17	(1 - 25)	110	110
18	(2 - 4)	150	121
19	(2 - 10)	130	129
20	(2 - 13)	140	112
21	(2 - 30)	110	103
22	(2 - 46)	120	95
比較例 (2)	(A - 3)	60	23

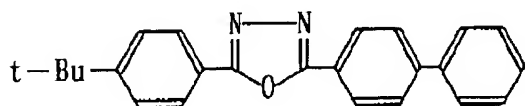
[0059]

[Formula 23]

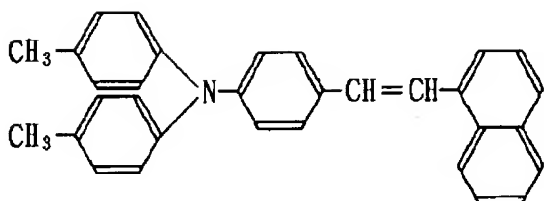
(A - 1)



(A - 2)



(A - 3)



[0060]

[Effect of the Invention] By using the specific organic compound concerning this invention, the organic electroluminescent element which is fully equal to practical use in luminescence reinforcement and endurance is obtained.

[Translation done.]